

What is claimed is:

1. A method for preparing an aqueous urethane resin composition, comprising the steps of:

- 5 (1) producing an aqueous polyurethane resin solution by
- (a) reacting 100-150 parts by weight polyester polyol, 30-50 parts by weight diisocyanate, 5-15 parts by weight dimethyl propionic acid or dimethyl butyric acid, and 3-10 parts by weight amine at 55-85 °C for 5-6 hours to give a prepolymer ranging, in NCO radical content, from 2 to 8%, said dimethyl propionic acid or dimethyl butyric acid serving as a hydrophilic moiety for water dispersion;
- 10 (b) dispersing the prepolymer at 30-40 °C in water; and
- (c) introducing into the water-dispersed prepolymer a chain extender selected from the group consisting of glycol, triol and diamine at 25-30 °C in such a way that the reaction mole ratio between said chain extender and NCO residues is controlled to give the final product with a molecular weight of 30,000-100,000;
- 20 (2) adding the aqueous polyurethane resin solution with block isocyan type or aziridine type curing agent at an amount of 3-15 % by weight based on the weight of the resin solid content.
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2. A method for preparing an aqueous lubricant urethane resin composition, comprising the steps of:

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(1) producing an aqueous polyurethane resin solution by

(a) reacting 100-150 parts by weight polyester polyol, 30-50 parts by weight diisocyanate, 5-15 parts by weight dimethyl propionic acid or dimethyl butyric acid, and 3-10 parts by weight amine at 55-85 °C for 5-6 hours to give prepolymer ranging, in NCO radical content, from 2 to 8%, said dimethyl propionic acid or dimethyl butyric acid serving as a hydrophilic moiety for water dispersion;

(b) dispersing the prepolymer at 30-40 °C in water; and

(c) introducing into the water-dispersed prepolymer chain extender selected from the group consisting of glycol, triol and diamine at 25-30 °C in such a way that the reaction mole ratio between said chain extender and NCO residues is controlled to give the final product with a molecular weight of 30,000-100,000;

(2) adding the aqueous polyurethane resin solution with block isocyan type or an azidirine type curing agent at an amount of 3-15 % by weight based on the weight of the resin solid content;

(3) adding a mixture comprising a fluorine resin-modified polyethylene and a polyethylene wax at a ratio of 1:0.3-1:0.7 to the resin solution at an amount of 5-30 % by weight based on the weight of the resin solid content, said fluorine resin-modified polyethylene wax ranging, in specific gravity, from 0.98 to 1.02 with a particle size of

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0.1-1.5  $\mu\text{m}$ , said polyethylene wax ranging, in molecular weight, from 1,500 to 3,000 with a particle size of 0.05-1.0  $\mu\text{m}$ ;

(4) adding a colloidal silica in the resin solution obtained in the step (3) at an amount of 10-30 % by weight based on the weight of resin solid content;

(5) adding in the resin solution obtained in the step (4) a coupling agent selected from the group consisting of silane coupling agents containing an epoxy group, an amine group, and/or an acryl group and titanium coupling agents containing phosphorus and/or an amine group at an amount of 0.1-0.5 % by weight based on the total weight of the resin solid content; and

(6) diluting the resin solution with pure water into a final resin solid content of 10-30 % by weight.

3. The method as set forth in claim 1 or 2, wherein said polyester polyol is used at an amount of 120-130 parts by weight based on the weight of the prepolymer reactants.

4. The method as set forth in claim 1 or 2, wherein said diisocyanate is used at an amount of 35-40 parts by weight based on the weight of the prepolymer reactants.

5. The method as set forth in claim 1 or 2, wherein said hydrophilic moiety for water dispersion is used at an amount of 8-10 parts by weight based on the weight of the prepolymer reactants.

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6. The method as set forth in claim 2, wherein said wax mixture is used at an amount of 10-15 parts by weight based on the weight of the prepolymer reactants.

7. The method as set forth in claim 1 or 2, further comprising the step of adding acetone and/or n-pyrrolidone solvent at an amount 10 % by weight based on the weight of the prepolymer reactants, before the dispersing step.

8. The method as set forth in claim 1 or 2, wherein said polyol is a polybutylene adipate based polyester polyol with a molecular weight of 500-3,000.

9. The method as set forth in claim 1 or 2, wherein said diisocyanate is selected from the group consisting of diphenylmethane diisocyanate, isophorone diisocyanate, and tolylene diisocyanate.

10. The method as set forth in claim 1 or 2, wherein said amine is triethyl amine.

11. The method as set forth in claim 1 or 2, wherein said chain extender is selected from the group consisting of glycols, such as ethylene glycol, 1,4-butylene glycol, and 1,6-hexane diol, diamines, such as ethylene diamine and isophorone diamine, triols such as trimethylol propane, and mixtures thereof.

13. A surface treatment of chromated, electroplated steel plates, comprising the steps of: coating, on an

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zinc-electroplated steel plate chromated at a chrome amount of 4-200 mg/m<sup>2</sup>, the aqueous lubricant urethane resin at a dry coating thickness of 0.5-5.0 μm, baking the steel plate at a steel temperature of 110-200 °C, and  
5 quenching the steel in water.

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